

REMARKS

Applicant respectfully requests reconsideration and allowance in view of the foregoing amendments and following remarks. In the Office Action, mailed December 12, 2002, the Examiner rejected claims 1-3, 7-10, 12-16, 19, 20, 25, 26 and 30, and objected to claims 4-6, 11, 17, 18, 21-24, 27-29 and 31. By this amendment, claims 16-18, 20-24 and 26-29 have been amended to better clarify the invention. Following entry of these amendments, claims 1-31 will be pending in the application.

Benefit of Priority

In the Office Action, the Examiner noted that the subject application did not comply with one or more conditions for received the benefit of an earlier filing date under 35 U.S.C. §120. Applicants file herewith a Request for Correction of Inventorship, which will correct this error in the application. Applicants request approval and entry of the Request for Correction of Inventorship.

Claim Objections

In the Office Action, the Examiner objected to claims 4-6, 11, 17, 18, 21-24, 27-29 and 31 as containing allowable subject matter, yet depending from rejected base claims. Applicants respectfully traverse the objections and request withdrawal of the objections.

Applicants thank the Examiner for noting the allowability of the subject matter contained in claims 4-6, 11, 17, 18, 21-24, 27-29 and 31. However, in view of the following remarks, Applicants assert that the rejected base claims are allowable over the art of record, which eliminates the necessity for rewriting the objected-to claims in independent form.

Claim Rejections under 35 U.S.C. §102(e)

In the Office Action, the Examiner rejected claims 1, 14 and 15 under 35 U.S.C. §102(e) as allegedly being anticipated by U.S. Patent No. 6,244,935 to Birang et al. (hereinafter "Birang"). Applicants respectfully traverse the rejections of claims 1, 14 and 15.

An anticipation rejection is proper only when a patent applicant has claimed an invention that "was described in ... a patent granted on an application for patent by another filed in the United

States before the invention by the applicant for patent.” 35 U.S.C. §102(e). A claim is anticipated under 35 U.S.C. §102(e) “only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1570 (Fed. Cir. 1988) (emphasis in original), *cert. denied*, 488 U.S. 892 (1988). “To establish inherency, the extrinsic evidence, ‘must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.’” *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999) (citations omitted). Upon reliance on a theory of inherency, “the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.” *Ex parte Levy*, 17 U.S.P.Q.2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original).

For at least the reasons stated below, Applicants assert that Birang fails to expressly or inherently describe each and every element of the invention claimed by Applicants and, therefore, that Applicants’ rejected claims 1, 14 and 15 are patentably distinct from Birang.

Claim 1

Applicants’ independent claim 1 recites a chemical mechanical polishing (CMP) apparatus for polishing a surface of a workpiece and for detecting a CMP endpoint that includes:

- an optically transparent polishing belt to polish the surface of the workpiece, the polishing belt being movable in one or more linear directions;
- a workpiece holder to support the workpiece, the workpiece holder configured to press the workpiece against the polishing belt;
- a support plate adapted to support the polishing belt as the workpiece is pressed against the polishing belt; and
- an optical detection system to detect the CMP endpoint, the optical detection system disposed below the polishing belt and comprising a light source and a detector, the light source sending outgoing signals through the polishing belt to the surface of the workpiece and the detector receiving incoming reflected signals from the surface of the workpiece through the polishing belt.

Birang neither discloses nor suggests a CMP apparatus for polishing a workpiece surface and detecting a CMP endpoint having an optically transparent polishing belt as required by independent claim 1.

In asserting anticipation of the invention as claimed in independent claim 1, the Examiner refers to, *inter alia*, a "transparent strip 118 in polishing sheet 110" of Birang. Birang discloses a generally linear polishing sheet having an exposed portion. Birang does not disclose or suggest the subject matter of independent claim 1 for at least the following reason.

Birang nowhere discloses an optically transparent polishing belt as required by independent claim 1. Rather, Birang discloses a transparent strip within a polishing sheet. The transparent strip in the Birang system "may be about 0.6 inches wide" and "may be formed by excluding abrasive particles from this region of the containment media during fabrication of the polishing sheet." Birang, col. 6, ll. 36-39. In contrast, Applicants' claimed invention discloses that the whole polishing belt is made of transparent materials and that the transparent polishing belt includes a thin layer of abrasives. Applicants' Specification, p. 9, ll. 7-12.

In summary, for at least the reason presented above, Birang neither discloses nor suggests the CMP apparatus for polishing a workpiece surface and detecting a CMP endpoint having an optically transparent polishing belt as required by independent claim 1. Accordingly, Applicant respectfully submits that independent claim 1 is allowable over the art of record.

Claim 14

Claim 14 depends from independent claim 1. The allowability of dependent claim 14 thus follows from the allowability of independent claim 1; as such, dependent claim 14 is allowable over the art of record.

Claim 15

Applicants' independent claim 1 recites a method for polishing a surface of a workpiece and for detecting a chemical mechanical polishing (CMP) endpoint that includes:

- pressing the workpiece against an optically transparent polishing belt, the polishing belt being supported by a support plate;
- polishing the surface of the workpiece with the polishing belt, wherein the polishing belt is movable in one or more linear directions;
- sending outgoing optical signals from a light source through the polishing belt to the surface of the workpiece, the light source disposed below the polishing belt so that the polishing belt is between the light source and the surface of the workpiece; and

receiving, at a detector, incoming reflected optical signals from the surface of the workpiece through the polishing belt and the support plate, the detector disposed below the polishing belt.

Birang neither discloses nor suggests a method for polishing a workpiece surface and detecting a CMP endpoint having an optically transparent polishing belt as required by independent claim 15.

In asserting anticipation of the invention as claimed in independent claim 15, the Examiner refers to, *inter alia*, a "transparent strip 118 in polishing sheet 110" of Birang. Birang discloses a generally linear polishing sheet having an exposed portion. Birang does not disclose or suggest the subject matter of independent claim 15 for at least the following reason.

Birang nowhere discloses an optically transparent polishing belt as required by independent claim 15. Rather, Birang discloses a transparent strip within a polishing sheet. The transparent strip in the Birang system "may be about 0.6 inches wide" and "may be formed by excluding abrasive particles from this region of the containment media during fabrication of the polishing sheet." Birang, col. 6, ll. 36-39. In contrast, Applicants' claimed invention discloses that the whole polishing belt is made of transparent materials and that the transparent polishing belt includes a thin layer of abrasives. Applicants' Specification, p. 9, ll. 7-12.

In summary, for at least the reason presented above, Birang neither discloses nor suggests the method for polishing a workpiece surface and detecting a CMP endpoint having an optically transparent polishing belt as required by independent claim 15. Accordingly, Applicant respectfully submits that independent claim 15 is allowable over the art of record.

103(a) Claim Rejections

In the Office Action, the Examiner rejected claims 2, 3, 8-10, 12 and 16 under 35 U.S.C. §103(a) as allegedly being unpatentable over Birang in view of U.S. Patent No. 6,146,248 to Jairath et al. (hereinafter "Jairath"). Further, the Examiner rejected claims 7, 13, 19, 20, 25, 26 and 30 under 35 U.S.C. §103(a) as allegedly being unpatentable over Birang in view of U.S. Patent No. 6,261,959 to Travis et al. (hereinafter "Travis"). Applicants respectfully traverse the rejections of claims 2, 3, 7-10, 12, 13, 16, 19, 20, 25, 26 and 30 and note the following standards for a proper §103(a) rejection.

A §103(a), or obviousness, rejection is proper only when "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time of the invention was made to a person having ordinary skill in the art to which the subject matter pertains." 35 U.S.C. §103(a). The Examiner must make out a *prima facie* case for obviousness. The *en banc* Federal Circuit has held that "structural similarity between claimed and prior art subject matter, proved by combining references or otherwise, where the prior art gives reason or motivation to make the claimed compositions, creates a *prima facie* case of obviousness." *In re Dillon*, 16 U.S.P.Q. 2d 1897, 1901 (Fed. Cir. 1990). The underlying inquiries into the validity of an obvious rejection are: "(1) the scope and content of the prior art; (2) the level of ordinary skill in the prior art; (3) the differences between the claimed invention and the prior art; and (4) objective evidence of nonobviousness." *In re Dembiczak*, 175 F.3d 994, 998, (Fed. Cir. 1999).

Further, the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990). Likewise, if the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 U.S.P.Q. 1125 (Fed. Cir. 1984).

For at least the reasons stated below, taking into consideration the standards for obviousness presented above, Applicants assert that the Examiner has failed to make out a *prima facie* case for obviousness and that one of ordinary skill in the art would not have considered Applicants' inventions obvious at the time of invention. Therefore, Applicants' rejected claims 2, 3, 7-10, 12, 13, 16, 19, 20, 25, 26 and 30 are allowable over the art of record.

Claims 2, 3, 8-10, 12 and 16

Dependent claims 2, 3, 8-10, 12 and 16 all ultimately depend from either independent claim 1 or 15. The allowability of dependent claims 2, 3, 8-10, 12 and 16 thus follows from the allowability of independent claims 1 and 15 (as discussed above); as such, dependent claims 2, 3, 8-10, 12 and 16 are allowable over the art of record.

Further, in rejecting claims 2, 3, 8-10, 12 and 16 for obviousness over Birang in view of Jairath, the Examiner cites Jairath as disclosing a transparent belt. Jairath, col. 9, ll 44-55. Jairath also discusses polishing agent transport channels for the slurry. Jairath, col. 8, l. 65 through col. 9, l. 10. In contrast, the present invention discloses a transparent belt that includes a transparent abrasive layer formed on a transparent backing material. Applicants' Specification, p. 9, ll. 9-13. Additionally, there is not suggestion or motivation within the cited art to combine Jairath with Birang.

In view of the above remarks, Applicants request the reconsideration and withdrawal of the rejections for dependent claims 2, 3, 8-10, 12 and 16.

Claims 7 and 13

Dependent claims 7 and 13 ultimately depend from independent claim 1. The allowability of dependent claims 7 and 13 thus follows from the allowability of independent claim 1 (as discussed above); as such, dependent claims 7 and 13 are allowable over the art of record.

Therefore, Applicants request the reconsideration and withdrawal of the rejections for claims 7 and 13.

Claim 19

Applicants' independent claim 19 recites a method of polishing a workpiece and of providing chemical mechanical polishing (CMP) endpoint detection that includes:

- providing an optically transparent polishing belt between a supply area and a receive area, the polishing belt having a first end and a second end and a polishing side and a backside, such that the first end initially comes off the supply area and is connected to the receive area and the second end remains connected to the receive area;
- polishing a first workpiece by moving a portion of the polishing belt in one or more linear directions within a polishing area; and
- detecting a first CMP endpoint of the first workpiece using an optical detection system, the optical detection system sending outgoing signals to and receiving incoming reflected signals from the first workpiece through the polishing belt, the polishing belt being located between the optical detection system and the first workpiece.

Birang in view of Travis neither discloses nor suggests a method of polishing a workpiece and providing CMP endpoint detection having an optically transparent polishing belt with a polishing side used for polishing and a backside as required by independent claim 19.

In asserting obviousness of the invention as claimed in independent claim 19, the Examiner refers to, *inter alia*, a "transparent strip 118 in polishing sheet 110" of Birang. Birang discloses a generally linear polishing sheet having an exposed portion. Birang in view of Travis does not disclose or suggest the subject matter of independent claim 19 for at least the following reasons.

Birang in view of Travis nowhere discloses or suggests an optically transparent polishing belt as required by independent claim 19. Rather, Birang discloses a transparent strip within a polishing sheet. The transparent strip in the Birang system "may be about 0.6 inches wide" and "may be formed by excluding abrasive particles from this region of the containment media during fabrication of the polishing sheet." Birang, col. 6, ll. 36-39. In contrast, Applicants' claimed invention discloses that the whole polishing belt is made of transparent materials and that the transparent polishing belt includes a thin layer of abrasives. Applicants' Specification, p. 9, ll. 7-12.

Further, Birang in view of Travis nowhere discloses or suggests an optically transparent polishing belt having a polishing side used for polishing and a backside as required by independent claim 19. Rather the transparent strip of Birang has no abrasive particles and is not used for polishing. Additionally, there is no suggestion or motivation in Travis to create the optically transparent polishing belt having a polishing side used for polishing and a backside.

In summary, for at least the reasons presented above, Birang in view of Travis does not disclose or suggest the method of polishing a workpiece and providing CMP endpoint detection having an optically transparent polishing belt with a polishing side used for polishing and a backside as required by independent claim 19. Accordingly, Applicant respectfully submits that independent claim 19 is allowable over the art of record.

Claim 20

Dependent claim 20 ultimately depends from independent claim 19. The allowability of dependent claim 20 thus follows from the allowability of independent claim 19 (as discussed above); as such, dependent claim 20 is allowable over the art of record.

Claim 25

Applicants' independent claim 25 recites a method of polishing a workpiece and detecting a chemical mechanical polishing (CMP) endpoint that includes:

supporting the workpiece such that the surface of the workpiece is exposed to a section of an optically transparent polishing belt in a processing area; and
polishing the surface of the wafer by moving the section of the polishing belt bi-directional linearly; and
determining a CMP endpoint for the workpiece by sending outgoing optical signals through the polishing belt to the workpiece and continuously examining the relative intensity of incoming optical signals reflected from the workpiece and received through the polishing belt.

Birang in view of Travis neither discloses nor suggests a method of polishing a workpiece and detecting a CMP endpoint having an optically transparent polishing belt as required by independent claim 25.

In asserting obviousness of the invention as claimed in independent claim 25, the Examiner refers to, *inter alia*, a "transparent strip 118 in polishing sheet 110" of Birang. Birang discloses a generally linear polishing sheet having an exposed portion. Birang in view of Travis does not disclose or suggest the subject matter of independent claim 25 for at least the following reason.

Birang in view of Travis nowhere discloses or suggests an optically transparent polishing belt as required by independent claim 25. Rather, Birang discloses a transparent strip within a polishing sheet. The transparent strip in the Birang system "may be about 0.6 inches wide" and "may be formed by excluding abrasive particles from this region of the containment media during fabrication of the polishing sheet." Birang, col. 6, ll. 36-39. In contrast, Applicants' claimed invention discloses that the whole polishing belt is made of transparent materials and that the transparent polishing belt includes a thin layer of abrasives. Applicants' Specification, p. 9, ll. 7-12.

In summary, for at least the reason presented above, Birang in view of Travis does not disclose or suggest the method of polishing a workpiece and detecting a CMP endpoint having an optically transparent polishing belt as required by independent claim 25. Accordingly, Applicant respectfully submits that independent claim 25 is allowable over the art of record.

Claims 26 and 30

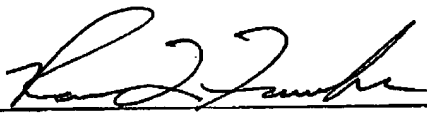
Dependent claims 26 and 30 ultimately depend from independent claim 25. The allowability of dependent claims 26 and 30 thus follows from the allowability of independent claim 25 (as discussed above); as such, dependent claims 26 and 30 are allowable over the art of record.

Conclusion

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition of allowance and a Notice to that effect is earnestly solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

CHARGE STATEMENT: The Commissioner is hereby authorized to charge fees that may be required relative to this application, or credit any overpayment, to our Account 03-3975, Order No. 042496-0269274 (NT-238).

Respectfully submitted,
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